

Lawrence Berkeley National Laboratory
Energy Analysis Department & Center for Science and Engineering Education

ENERGIZED LEARNING

Energized Learning deploys a new educational interface for a sophisticated web-based energy calculator and home energy audit toolkit developed by U.S. Department of Energy scientists at the Lawrence Berkeley National Laboratory – The Home Energy Saver (HES) <http://HomeEnergySaver.lbl.gov>. Student projects involve household- and community-scale data gathering and analysis. Using the website as a “virtual laboratory”, students analyze their home’s energy use and savings opportunities, synthesizing their analyses by placing the energy use and associated greenhouse-gas emissions in terms of a “carbon bubble” whose diameter varies depending on the home’s efficiency.

Energized Learning conveys a series of “big ideas”, i.e. conceptual perspectives that can in turn be used to drive home specific educational standards. These include:

- **Quality of life can be increased without elevated energy use.** Energy use provides an array of “services”, such as illumination, comfort, etc. Increased efficiency of energy use can secure services with lower resource inputs, costs, and energy-related pollution.
- **Energy and environment are inextricably linked.** Energy production and end-use technology choice yields a range of pollutants, particularly those related to the greenhouse effect. Choices of energy mix and the efficiency of products have calculable environmental consequences and potential benefits.
- **Achieving efficiency is an investment, not an expenditure.** Cashflow analysis illustrates how a household budget can benefit from investing in efficiency upgrades.
- **Understanding and managing energy use is an interdisciplinary pursuit.** It involves science, engineering, mathematics, economics, and social science.

The site will serve three audiences: students, teachers, and parents. Students will use the site as a virtual laboratory, supported by pre- and post-lab classroom discussion. Teachers are provided with a clear “mapping” of EL exercises to education standards—with emphasis on the Benchmarks for Scientific Literacy <LINK to....>--and means of measuring progress and mastery of core concepts via focused worksheets. Parents will be able to engage students in practical discussions and planning about managing a household budget and cost of living through energy management.

Energized Learning develops student skills in:

- The art and science of investigation, data collection, analysis, and critical thinking
- Computer modeling and limitations of models
- Math: unit conversions, geometry, algebra, statistics
- Chemistry: e.g. moles, gas constants
- Data visualization and graphing
- Building Science (the physics and math of energy flows in buildings)
- Climate change and its relationship to Earth Science
- Formulating opinions and views based on results and local/national implications